

What is claimed is:

1. An optical signal performance monitoring apparatus in a multi-channel optical transmission system, the optical signal performance monitoring apparatus comprising:

an optical input unit for controlling the spot size of an inputted multi-channel optical signal and generating the 1st multi-channel beam;

an optical collimation and focusing unit for collimating the 1st multi-channel beam and focusing the 2nd multi-channel beam which is divided by wavelength;

a diffraction and reflection unit for diffracting and reflecting the 1st collimated multi-channel beam, and generating the 2nd multi-channel beam which is divided by wavelength and is in parallel with the 1st collimated multi-channel beam; and

an optical detection unit for measuring the intensity of the 2nd multi-channel beam by wavelength, which is focused by wavelength by the optical collimation and focusing unit.

2. The apparatus of claim 1, wherein the diffraction and reflection unit comprises:

a wavelength divider for generating the 3rd multi-channel beam by dividing the multi-channel beam collimated by wavelength by the optical collimation and focusing unit, and generating the 2nd multi-channel beam that is positioned in parallel with the 1st multi-channel beam on the same plane by dividing again the multi-channel beam by wavelength;

a polarization converter for changing the state of polarization of the 3rd multi-channel beam and the multi-channel beam reflected by the optical reflection unit;

and

an optical detection unit for being tilted by the 1st predetermined angle and reflecting the 3rd multi-channel beam inputted from the polarization converter by the 2nd predetermined angle, and outputting the reflected multi-channel beam to the polarization converter.

3. The apparatus of claim 2, wherein the surface of the wavelength divider is the diffraction grating designed to divide and reflect or diffract the multi-channel beam

incident on the grating by wavelength.

4. The apparatus of claim 3, wherein the multi-channel beam inputted from the optical collimation and focusing unit to the diffraction grating and the multi-channel beam inputted from the reflection unit to the diffraction grating are positioned nearest to the center of the diffraction grating by controlling the tilt of the optical reflection unit and the distance between the optical reflection unit and the wavelength divider.

5. The apparatus of claim 2, wherein the polarization converter is a quarter wave plate and converts the state of polarization of the multi-channel beam passing through the quarter wave plate by 45 degrees.

6. A method for monitoring an optical signal performance in a multi-channel optical transmission system includes:

(a) step of controlling the spot size of an inputted multi-channel optical signal and generating the 1st multi-channel beam;

(b) step of collimating the 1st multi-channel beam;

(c) step of diffracting and reflecting the 1st collimated multi-channel beam, and generating the 2nd multi-channel beam which is divided by wavelength and is in parallel with the 1st collimated multi-channel beam on the same plane; and

(d) step of focusing the 2nd multi-channel beam, measuring the intensity of the 2nd multi-channel beam focused by wavelength, and measuring the optical signal-to-noise ratio by measuring the optical intensity corresponding to each wavelength and an amplified spontaneous emission (ASE) noise strength at the point between optical signals.

7. The method of claim 6, wherein (c) step includes:

(c1) step of generating the 3rd multi-channel beam by dividing and diffracting the 1st multi-channel beam collimated by wavelength;

(c2) step of changing the state of polarization of the 3rd multi-channel beam;

(c3) step of reflecting the 3rd multi-channel beam changed the state of polarization in (c2) step by a predetermined reflection angle;

(c4) step of changing the state of polarization of the multi-channel beam reflected in (c3) step; and

(c5) step of generating the 2nd multi-channel beam by dividing and diffracting the multi-channel beam changed the state of polarization in (c4) step by wavelength.

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8. The method of claim 7, wherein the state of polarization of the 3rd multi-channel beam and the reflected multi-channel beam are changed by 45 degrees in (c2) and (c4) steps.

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